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ABSTRACT

This paper considers the potential utility of computer conferencing for the Third World. A brief description of an example of a computer conferencing system, the Electronic Information Exchange System (EIES) based at the New Jersey Institute of Technology, is provided. International discussions on telecommunications and some of the activities of multinational organizations which affect the extension of technology to developing nations are noted, as well as technical constraints on the extension of telecommunications technology. Applications of computer conferencing to education, employment, and information transfer are described, and there is some consideration of the social consequences of the introduction of such a program. General guidelines for the future implementation of computer conferencing are also given. A 26-item bibliography concludes the paper. (Author/ESR)

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COMPUTER CONFERENCING FOR THE THIRD WORLD
ROADMAP FOR THE FUTURE

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COMPUTER CONFERENCING FOR THE THIRD WORLD
ROADMAP FOR THE FUTURE

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ABSTRACT

This paper considers the potential utility of computer conferencing for the third world. Some of the activities of multi-national organizations will be referred to as they affect the extension of technology to developing nations. Technical constraints will be noted. Applications of computer conferencing to education, employment and information transfer will be described as well as some consideration of social consequence. Some general guidelines for future implementation of computer conferencing will be noted.

INTRODUCTION

> Heartland technologies are those which can give leverage over the system as a whole and raise its level of performance. Steam power and electric power were such key technologies in their time. Today, electronic information technology represents this heartland technology...the capacity to handle,process, store and transmit information is now the critical technology for advanced industrial countries both for industry and for service. (Freeman, 1978)

Clearly the lack of effective communication systems is an impediment to industrial collaboration, research cooperation and resource sharing in many countries of the third world. The process of building a traditional communication infrastructure is slow and expensive. The IDRC Conference has pointed to the need to enable scientists within a developing country to communicate with each other and their colleagues in other countries, both industrialized and developing. (IDRC Report, 1981) This paper will examine instances of effective use of teleconferencing as well as chart some feasible potentials for the future. As Ithiel de Sola Pool has noted

> Technology exists today that would, if used, reduce the cost of global teletypewriter communications to levels approximately like the present cost of the mails or of local telephoning. Such low cost, high speed, long distance communication

facilities would, if implemented, profoundly modify patterns of international interaction in business, science, culture and government. (De Sola Pool and Corte, 1975).

It is not accidental to note that Time's Man of the Year, a designation which has been frequently used in the past to recognize global achievement, has this year turned to the computer itself. Computers have been essential in the development of technology for communication. Telecommunications as such, encompasses a broad range of technologies and approaches. Teleconferencing can be conducted through telephone, television, or through computers. Each has strengths and weaknesses, yet computer conferencing has unique applicability to the third world. Video conferencing is at this point quite expensive; telephone conferencing lacks the capacity for asynchronous communication and the establishment of a permanent record. Computer conferencing overcomes the limits noted at reasonable cost. An example of one such computer conferencing system is the Electronic Information Exchange System (EIES) based at the New Jersey Institute of Technology, a brief description of which follows:

DESCRIPTION OF EIES

The EIES system has been thoroughly tested and it has been demonstrated that inexperienced users with limited understanding of computer technology can become proficient in about a week. Computer conferencing provides a cost effective way of providing for interaction between affected parties.

The EIES system becomes a medium to link geographically dispersed groups of participants to evaluate various programs. Additional advantages of EIES in carrying out projects are the following factors: permits participants to interact at times of their choice; provides for continued interaction between participants; provides a written record of interactions which may be edited and reviewed numerous times as necessary; system can be used at a rate which is roughly one quarter of the cost of a long distance call; the original information can be retrieved from the system at any time.

EIES is not a conventional computer system but rather a communication system which has been designed to be maximally user responsive. EIES has provided over 300,000 hours of service to users all over the continental United States, Hawaii, Alaska, Canada and Europe. The system is operated through a standard computer terminal which functions like an ordinary electric typewriter which has an acoustic coupler allowing it to be connected by any telephone to the system.

Through Computerized Conferencing, the potential exists for participants world wide to engage in many conferences simultaneously as well as to maintain informal liaison with colleagues, similar to conversations over lunch. Not only can participants enter conferences from any location but they can still attend to all on-site local responsibilities. Thus the

power of the individual to act, interact and react is reinforced by this technology.

> Individuals have reported that continual use of the process creates shifts in their behavior by providing a context rich stream of information from an ever expanding network of new contacts augmented by a system that enables them to manage spatial and temporal cognitive structures more effectively. (IDRC, 1981)

The notion of collective wisdom is effectively sustained through Computer Conferencing. Picture a circumstance where small cadres of government officials in remote areas of the world have just effectively dealt with some critical issue such as flood, epidemic, earthquake, or major funding problem. Much of their experience and insight is forever lost if there is no way to capture and transmit their experiences. Many governmental administrators know more than they think they do and their information and experience could easily be shared through interactive computer conferencing. If one can conceive of a global situation in which key decision makers are linked to their counterparts, the potential for timely and effective communication is impressive indeed. This optimistic view, however, suggests that the benefits of collaboration and information sharing will outweight the tendency towards parochialism and confidentiality.

INTERNATIONAL DISCUSSIONS ON TELECOMMUNICATION

There have been instances of the use of computer conferencing to assist in delineating of topics for later concern. Preliminary findings suggest the efficiency of such systems for technological forecasting and planning for social change.

One such instance was described as permitting eight geographically separated expert panels in European and Soviet Countries participate in a Delphi type exercise conducted in connection with a workshop entitled "Systems Assessment of New Technology; An International Perspective" conducted by the International Institute for Applied Systmes Analysis (IIASA). While there were no significant technical differences, a number of socio-psychological and procedural problems arose that were sufficiently serious to prevent substantively useful results from being obtained. (Rauch and Randolph, 1979). One of the key problems in the use of interactive technology is insufficient regard for the human ware. Harware, software have thus far been the major components, but the need for appropriate human interventions are necessary preconditions for successful implementation.

Each separate IIASA panel was equipped with a terminal that had online access to the program. The computer had two main functions; to calculate numeric operations and secondly,to store the results of each group and calculate the necessary statistical values for all panels together. A key finding was

that geographically separate scientisits could productively interact anywhere regardless of continent or country.

Each panel had one responsible individual from the start who could be called upon to assemble a panel of interested participants, motivate and supervise his panel activities and deal with unexpected situations.

Other findings were that some participants did not wish to remain within the predesigned group interaction procedures. Postmortem discussion revealed doubts about the answerability of questions asked, the ability of organizers to synthesize individual contributions into a valid group result, and resentment of the orderly conduct of activities. One panel revised the procedures which turned out to be particularly effective in retaining group morale and generating rich output. Thus it is apparent that procedural improvements can have a marked effect on participant satisfaction and outcome quality.

In summary, the experiment was considered successful. Communication on a continuing basis between randomly chosen places and continents can work. It was also apparent that it was possible to completely integrate different communication facilities into a common network. The organizational aspects, as opposed to the technical components was not as successful and this requires further analysis and attention.

Another international symposium devoted to research on the evaluation and planning of new person to person telecommunications took place at the University of Bergamo in northern Italy. Discussions centered around the delivery of health care, education and community services, scientific and technical information, teleconferencing and computer conferencing services. At this symposium trials were conducted of new services, use of information technology and the development in the field of electronic fund design systems. (Elton, 1978,)

Studies have been undertaken throughout the world. One such report was generated by the Royal Institute of Technology in Stockholm. This was prepared to stimulate discussion on how to design a Swedish policy on information science and technology. They examined systems for current information retrieval, teleconferencing, office automation and library automation. Research on artificial intelligence and linguistics relating to the need for research cooperation in Sweden, was assessed.(Lofstrom, 1981).

The General Conference on the UN Educational, Scientific and Cultural Organization (UNESCO) concluded at its 21st session to initiate studies for the definition of a new world information and communication systems. They also voted to develop an International Program for the development of Communication (IPDC) with a view to eliminating disparities in the information and communication field between developed and underdeveloped countries.

The objectives of IPDA will include the assistance to developing countries at their request in the elaboration and implementation of their information and community development plans; promoting the infrastructure of community sectors; improved international exchange of information as well as the provision of consultative and advisory services to the developing countries in the field of community development. (UN Chronicle 1/81).

The United States has supported the UN plan to improve the communications of underdeveloped countries but has stressed that the plan must also include freedom of expression. Western governments are expected to seek to insure that the community program concentrates on practical assistance to poorer nations. The conference, ideally, should work out ways of establishing channels for a free and balanced flow of information and the development of communication as an agent of economic, social and cultural development.

ISSUES OF TECHNICAL SUPPORT

Some of the problems of communication are affected by phone availability. After installing half of the coutries telephones in 53 years of operation, ITT is pulling out of Brazil. Due to Japanese competition and government delays in selecting new technology ITT is selling to a private investment bank from Brazil.

The Brazilian market has good long run economic prospects. With only 7 phones per hundred people in 1983 it is destined to become one of the worlds richest telecommunication markets. (Business Week, 1981).

Satellites are not immune to difficulties. The International Telemunications Union (ITU) is a UN agency that governs technical standards for worldwide communication. (In an attempt to bar Israel from a 1982 meeing, the third world is changing the complexion of the ITU meetings from technical to political).

To make communication satellite available for 24 hour use, they must be parked at a fixed point in orbit. Currently ITU rules do not award these orbital spaces in perpetuity and third world countries are pushing for territorial control over the orbital slots above their borders (Business Week,1982).

A computer can be made to show suspicion about the data it receives through a telephone interconnect. The transmission can easily scramble the zeros and ones that compose the binary data telecommunications.(New York Times,November 2, 1982).

Fujitsu ltd., Japan's largest computer maker and a leader in fiber optics technology, was turned down by AT&T to build a 404 mile portion of the 776 mile fiber optics telephone network being installed between NY, Boston and Washington, although it was low bider at 56.5million. AT&T awarded the contract to the lowest domestic bidder, Western Electric at 75 million, using a

national security argument.

Fiber optics technology converts telephone signals into light pulses that travel through strands of extremely pure glass as thin as human hairs. A single cable has 48 strands, no thicker than a finger, can carry simultaneously 80,640 calls. Fiber is immune to cross talk and electrical interference and difficult to tap illegally without being detected. Eventually , it can be used in cable-tv systems for advanced two way communication systems

Probably the biggest problem that will be encountered is dealing with the variations in telephone quality and service on the international circuits and within the country. While there is some standardization on international lines as to bandwidth and "protected" frequencies used for signals, there may be some restrictions. England, for example, has a different touch-tone group than the U.S. and seems to be sensitive to the standard U.S. RS--232 modem tones.

In addition, there may be some problems if one communicates via a satellite path. In some cases the time delay between when a computer answers, the automatic answer tone comes on and the response time from the originating modem is too great. Due to the time delays in the satellite path, the U.S. computer thinks that no one has connected the modem and turns itself off. The satellite path may present some problems if one is relying on the host computer "echoing" characters back to the terminals. Or if there is some sort of "hand shake" between the two units required for proper These technical issues with their underlying policy implications need to be addressed with some urgency. The communication process cannot realistically occur without such resolution. functioning.

APPLICATIONS TO EDUCATION

One of the most immediate potential applications of Computer Conferencing is to education. Through the asynchronous mode and the provision of an interactive continuing editable transcript, the instructor and participants can remain stationery with information itself travelling. ALthough efforts in this area are only now beginning to emergy, the utility would be great for some already existing educational efforts. The delivery of vocational education in Alaska through different media is instructive. Thirty such strategies were described by Jackson to overcome problems of delivering vocational programs in small rural schools. The study was designed to provide easy adaption to local use. Strategies of cooperative schools, flexible scheduling, use of television and radio, learning systems, correspondence studies, mini courses, learning on atheletic trips, teacher exchanges, conference calls, computer assisted instruction, independent study, and programmed activities all were used.(Jackson,1978)

The current activities of Nepal would lend themselves very easily to computer conferencing. Beginning in 1971 The International Education System Plan was undertaken in Nepal to

modernize education. Emphasized most strongly was vocational education to meet the countrys technical manpower needs. The attempt was undertaken to make education more relevant to the needs and aspirations of Nepal by linking education with productive enterprise and egalitarian principles. The result was reorganized school programs including work programs integral to the school curricula, character building, pre vocational training integrated with school curriculum. The earning while learning program and the plan to involve vocational education students in local developemnt projects have been proposed.

Here is an instance of a delivery system of activities that could well be accomodated by Computer Conferencing. Given the sometimes limited numbers of skilled professionals available for instruction, the use of on line conferences would permit the broader dissemination of knowledge at reduced cost.

To date, little formal adult education exists, but government agencies, cottage industries, private agencies and national youth programs provide a small percent of the out of school population with crafts, religion, agriculture and literacy training. Centering in the schools and youth organizations are several projects including the education for rural transformation and the Badikhel drinking water project.(Nepal National Education, 1978)

Another example of the use of teleeducation was summarized by Hammon in considering the activities at the British Open University. Large numbers of students at the Open University of England are prevented from having any higher education by factors such as geographic remoteness, physical disability and financial or family obligations. Most are full time employees and or raising a family.

The Open University communicates via mail or radio or television. Students may attend tutorial regional study centers once or twice monthly or attend summer school. Telephone teaching provided the first opportunity for involving students in tutorials, discussions and self help programs. Equipment allowed up to eight students and tutor per discussion out of their homes.

The major reason for taking part in conference calls were that leaving home or meeting new people at the study center was difficult when evening or shift work clashed with normal tutorial time.

The overall structure of the conference call was dependent upon the ledership or teaching style of the tutor. Some calls followed a pattern of lecture and discussion, while others were more informal. Individuals were asked to identify themselves when asking a question. Tutors invited named individuals to respond. Due to structured conversation, more individual participation was encouraged.

It was more difficult to describe via conference calls such subject matter as the sciences. Some felt telephone contact was

restricting; some felt that the tutorial group was threatening at the center and felt more at ease with conference calls. Some who did not readily use telephones were unhappy with having to rely on the phone more Tutors felt that the main advantage was bringing study centers via phones to those who would otherwise not have been reached.(Hammond, 1978)

Applications to computer conferencing has also been applied to executive development and continuing education. The Western Behavioral Science Institute based in La Jolla California, uses computer conferencing through the EIES network to run multi disciplinary development courses for high level industrial and government leaders. They are able to draw upon an international faculty as well as an international student body to jointly participate in a learning experience. A special benefit is that the entire range of transmissions remains intact for review and modifiction at will. In addition, the mechanism of computer conferencing permits a broad degree of participation between students and conference leader as well as between participants.

The New Jersey Institute of Technology is currently conducting a range of continuing education courses with a widely dispersed faculty as well as am equally dispersed student body. Courses that have been run thus far on EIES have included the following HUMAN COMMUNICATION VIA COMPUTER; COMPUTER LITERACY:A GENERAL APPROACH; ALTERNATIVE LEADERSHIP STYLES; APPLE II MICROCOMPUTERS: BASIC AND DOS; ENERGY OPTIONS AND DECISION MAKING; HOW TO START OR ADVISE A SMALL BUSINESS; LOCAL AREA NETWORKS; MATHEMATICS FOR FINANCIAL INVESTMENT; PASCAL PROGRAMMING: AN INTRODUCTION; PERSONAL DEVELOPMENT PROGRAM; THE SCIENCE FICTION CONNECTION ; SELECTING AND EVALUATING MICROCOMPUTERS; TECHNICAL WRITING FOR PROFESSIONALS; TECHNOLOGICAL FORECASTING METHODOLOGY; TRS'Ø MICROCOMPUTERS;BASIC AND DOS; VIEWS OF THE FUTURE BY FUTURISTS;

Additional seminars that have used the EIES network included the following which was designed as a series of seminars for the college faculty of eleven east coast liberal arts colleges. COMPUTERS AND SOCIETY;CONTEMPORARY MANAGEMENT ISSUES; COMPUTERS AND EDUCATION; COMPUTERS IN UNDERGRADUATE EDUCATION; ELECTRONIC CLASSROOM;COMPUTERS IN FOREIGN LANGUAGE INSTRUCTION; ACADEMIC INFORMATION SYSTEMS; COMPUTERS IN TEACHING COMPOSITION.

The implication of this for educational transmission is most provocative. One can begin to envision an international university of the future that transcends national boundaries and begins to point towards a heightened collaboration..

Computer conferencing can be of benefit to education on a number of levels. It can be used for teacher training and development, for conventional course transmission, for management development as well as for continuing education. The courses can run as short or as long as is necessary which may have special value for short range projects of skill training.

In remote areas of the world where travel is time consuming

and expensive, as well as where there may be shortages of trained manpower, this would permit continued interaction for developmental purposes, and stretch the talent over broader terrains.

The experience and insight of various locales can be helpful in providing examples and case studies to be generated for review and analysis by new neighbors and as yet unknown allies. This can well become the body of text for future sessions. Motification through conputer conferencing is easy and retention can be for as long as is desired.

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APPLICATIONS FOR EMPLOYMENT

Currently, more western European countries are actively trying out alternative work patterns including flex time, home based work, part time employment, job sharing, reduced work week or deferred or encouraged retirement.

This upsurge is due, in part, to the manpower shortages that resulted from declining birthrates. At the same time there has been rising unemployment and an absence of skilled labor. While the situation is different, of course, in Europe there are certain interesting implications for underdeveloped coutnries.

Through computer conferencing, scarce leadership and monitoring skills can can be widely transmitted In management, it becomes much more feasible if one can extend management application which would then permit the hiring and training of secondary level managers at minimal cost.(Zippo,1982)

Reasons for opposing this application can come from union opposition and government as being potentially exploitative. In addition some types of businesses do not lend themselves to computer management.

In developing countries with limited resources, permitting individuals in sevice industry to work from home would help conserve the costs of office and plant space. Computer conferencing becomes most viable as a cheap and efficient communications technology. Job sharing brings more secondary and university graduates into the work force.

The applicability of this to faculty members of regional universities would also be interesting. It would help professors to increase their understanding and awareness of the business world and thereby improve their marketability.

Some other side effects of the employment issue are the following:. insufficient initial thought is given to hidden costs; government and organizational leadership may be inadequately committed; union opposition and inadequate consideration to solving production problems is a factory. There may have been a failure to brief and train employees on the

flexibility of planning permitted by this new technology. (Johansen and DeGrasse, 1979).

Positive aspects would include more international communication, and expectation of a sense of community among those interested in interacting despite geographic barriers. It has been found that computer conferencing is often done outside of regular office hours which permits greater flexibility in working. Individuals can meet without being present. As Johnasen and De Grasse have noted, theere are three general usage types which are particularly effective.(Johansen and De Grasse, 1979) The function of exchange, where there is a strong need to stay in touch and where conferences typically last longer than a year. That type of project interaction would be costly and unfeasible for underdeveloped countries. The second purpose is to build greater cohesiveness and interpersonal sharing permitting more in depth discussions Finally for seminars which would address specific topics intensively over a limited period. This leads to greater variattion in where individuals live and work. They can stay in touch while travelling, or being homebound. It can be used for joint authorship, review, information exchange, scheduling, planning and follow up for face to face meetings.

There are occasionally difficulties over national borders. Computer networks as in England are not approved for carrying communication services. Thus the technology is itself illegal. There would have to be some resolution on a broad interational basis before further activity could take place.

The occupations that used to be assumed wthout question are now under siege. In India a survey was done of the values of rural youths in eight western bengal villages. They were asked for their choice of career in agriculture in relation to other occupations including service, business, cottage industry, agriculture and day labor. Some respondents indicated that agriculture would have been their first choice if more renumerative. There is also evidence from those who said they preferred service that they said so because of insufficient land. However, the low ratings for cottage industry is stated to present a gloomy picture since this ocupation could supplement agriculture and absorb a substantial numbers of unemployed rural youth. Measures such as bringing electicity into rural areas and developing processing industries for agricultural communities should be given serious thought. The use of computers would be essential not only as the main source of income, but as was suggested here also for the purposes of supplementing existing activity.

For those parts of the world where seasons control to a strong degree the amount of activity, income generated from the home activity would help improve the standard of living. (Kanti, 1972).

Prior to the Khomeini revolution there was evidence of greater interest in tecnology in Iran. During the reign of the Shah there were changes in the life of women in Iran in

education as well as in the imposition of equal pay for equal work. The encouragement of a cottage industry for handicrafts was once regarded as a valuable outlet for the talents of handicrafts and was supported by the Ministry of Economics. The Ministry regarded this as effective not only because of its retention of Iranian culture but also because it had the potential of improving the income level of men and women in the export of the art. (Friedman,1982).

The leadership and coordination of cottage industries could be easily facilitated by computer conferencing and could also provide a social network to reduce the isolation of home bound workers.

RECOMMENDATIONS FOR IMROVING ADAPTATION TO TECHNOLOGY

> The transformation to an information based society would have profound implications for the quality and nature of human society. It promises major increases in the quality of human life, the productivity of industry (especially in the service sector) and a redefinition of what constitutes real GNP. Revolutionary impacts are likely on many areas of vital concern to governments, including education, the transfer of funds, trade facilitation, consumer information, public administration, health services, transportation and culture. Indeed, within the financial and administrative areas, the effects have already been significant even though they represent but the first ripples from the tidal wave of change that lies ahead.(OECD,1966).

Providing Impetus for Change

Probably one of the more difficult aspects of the use of this new technology is the fact that Computerized Conferencing is hard to define or describe to those who have not had some familiarity with the process. It may be necessary to find a mode of showing the process without necessarily having individuals experienced in computer interaction - films have often been used for publicity or propaganda depending on one's bias. One cannot always depend on a technology promoting itself. Demonstration of a problem likely to be of interest to underdeveloped countries and how it was solved or ameliorated by Computerized Conferencing would be helpful. Sound tracks would have to be in different languages. If certain countries with sufficient development to sustain telephones on a regular basis as well as some basic computer technology could be joined on some defined project, this could serve as a pilot for other broader scale projects.

Establishing appropriate change agents

The ideal circumstance would be to find nationals of

various countries who could serve as bridges between the developed and underdeveloped countries. one such example might be a combination of locally trained professionals coupled with professionals who received their education abroad. One has to be cautious not to undermine the local at the expense of the individual more likely to be attuned with the goals of the developed countries. Peter Drucker spoke of the problem of Japanese returning to Japan after American training and lacking the "godfather" patron that had served to shield the young Japanese getting their education in Japan. A considerable stress on team work of the developed and underdeveloped must be maintained.

Recognizing prestige/perception barriers

High level officials and individuals with advanced degrees may be reluctant to be seen with what resembled a typewriter (a view similar to that of women who will deny they can type) One needs to establish an acceptable jargon. Although it may seem fanciful, sales representative is more appealing than salesperson, police officer is better than cop and so forth. Some consistency in language will have to be developed so as not to unnecessarily offend those who are culturally unprepared for the great leveler of the typewriter.

Some inventory needs to be taken or research done as to task attitudes within the various countries and appropriate adjustments need to be made. For example if "Interactive Communicator" will be Computerized Conferencing would be helpful rather than console operator or heaven forfend, typist, then so be it. Egos are vulnerable and particularly if combined with a basic apprehension of being tried and found wanting in a new technology.

There are several factors accounting for the trend toward Government involvement in the computer industry: 1)the spread of computers into offices and homes has created a political constituency. 2)the unregulated data processing industry is merging with traditionally regulated telecommunications industry. 3)Japan and many European countries believe the information processing industry is of strategic importance; therefore, government backed industry prevails. In order for American companies to compete, they will have to increasingly rely on Washington. 4)At present there are no standards for computer-to-computer communications. Some feel that if the industry does not end the babel of incompatible languages, the government will. (Pollack, 1982).

Monson has isolated four separate areas which appear to relate to the effectiveness and satisfaction of teleconferencing programs. First humanization or the creation of an environment, which emphasizes the importance of the individual and which overcomes any barriers of distance by generating a feeling of group rapport. This is done by establishing some type of personal information base about group members and in identifying with with people by using participants names frequently. Secondly, one can provide for participation in the communication

and learning process by allowing a more natural interaction to take place. Thirdly there is the need for a presentation style which constructs the message in a way that can be received, understood and remembered effectively. One should recognize that the audience may easily get distracted and therefore repetition and summary from time to time is worthwhile. Outlines with supplemental articles and materials is also useful. Finally, and most significant is the use of feedback to enable both speaker and listener to correct errors and ommissions and thereby improve future communications. (Monson,1978).

AREAS FOR FUTURE ANALYSIS

Stursberg has indicated three key areas for future research. First to determine how quickly the technologies will become available and which economic sectors are most at risk.

Secondly detailed analysis should be undertaken to determine which jobs and categories of workers are most at risk. He suggests that case analysis and analysis of occupational data is essential.

Finally Stursberg suggests that attention my be paid to the non employment impacts of information technology.

> Among other things, it has been claimed that its advent will result in de-skilling of most semi-skilled and in some cases, highly-skilled jobs. Fears have been expressed that this will result in a situation where only two types of jobs will remain; elite positions(lawyers, intellectuals,civil servants, systems analysts, etc.) and drudgery positions (janitors, machine tenders, grounds keepers etc) (Stursberg,1982).

The developing nations now have the option of expanding their educational and employment resources through computer conferencing. Despite some perceived difficulties in using the new technology, the eventual consequences will justify the efforts. The experiences of each new region becomes part of the roadmap of the future. Yet all who share in the process bear the responsiblity of charting their experience for the benefit of their international neighbors.

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